Processes, sound synthesis models and the computer designed for musical creation

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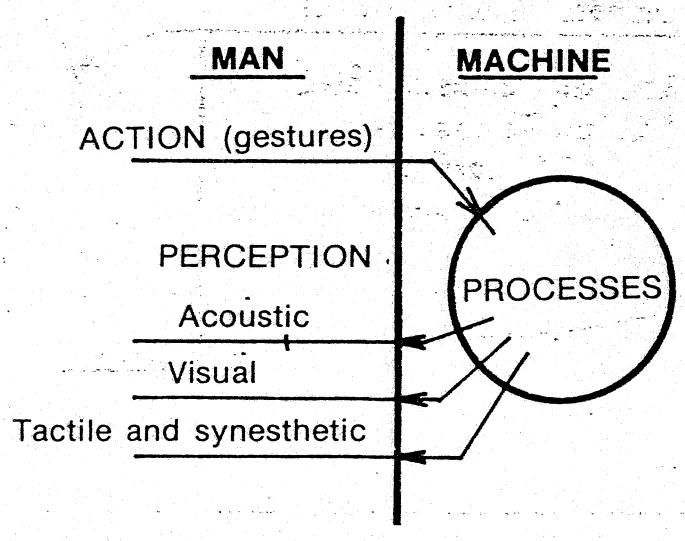
Two basic events laid the foundations of computer music. The first of these occured in the 60's when it was proven that computers fitted with digital-to-analog converters could synthesize any sound ad libitum, thanks to the MUSIC V program (8). The second break-through occured in the 70's, in the frantic race for real time processing. As early as 1976 (1) the first processors were developed making an instantaneous relationship between controls and digitally produced sounds possible, as had always been the case with traditional sound production techniques.

Thanks to the retroactive gestic transducer (3) (4) we have introduced gestic communication with instruments, a component of the man-to-machine relationship in computer music. It is now possible to have a sensorially «complete» relationship between man and the computer (figure 1), independently of the quantitative aspects linked to the machine's power. Indeed, four basic means of communication between man and his environment are restituted : gesture, sight, hearing and proprioceptive perception (i.e. touch and synesthetics). A full comprehensive technological framework for computer music is now available. It is indeed possible to transpose all previously known relationships between the creator and all his tools into a relationship between the creator and the computer. Any function of the machine chosen at random can virtually be employed via a specific digital process, provided the machine is powerful enough.

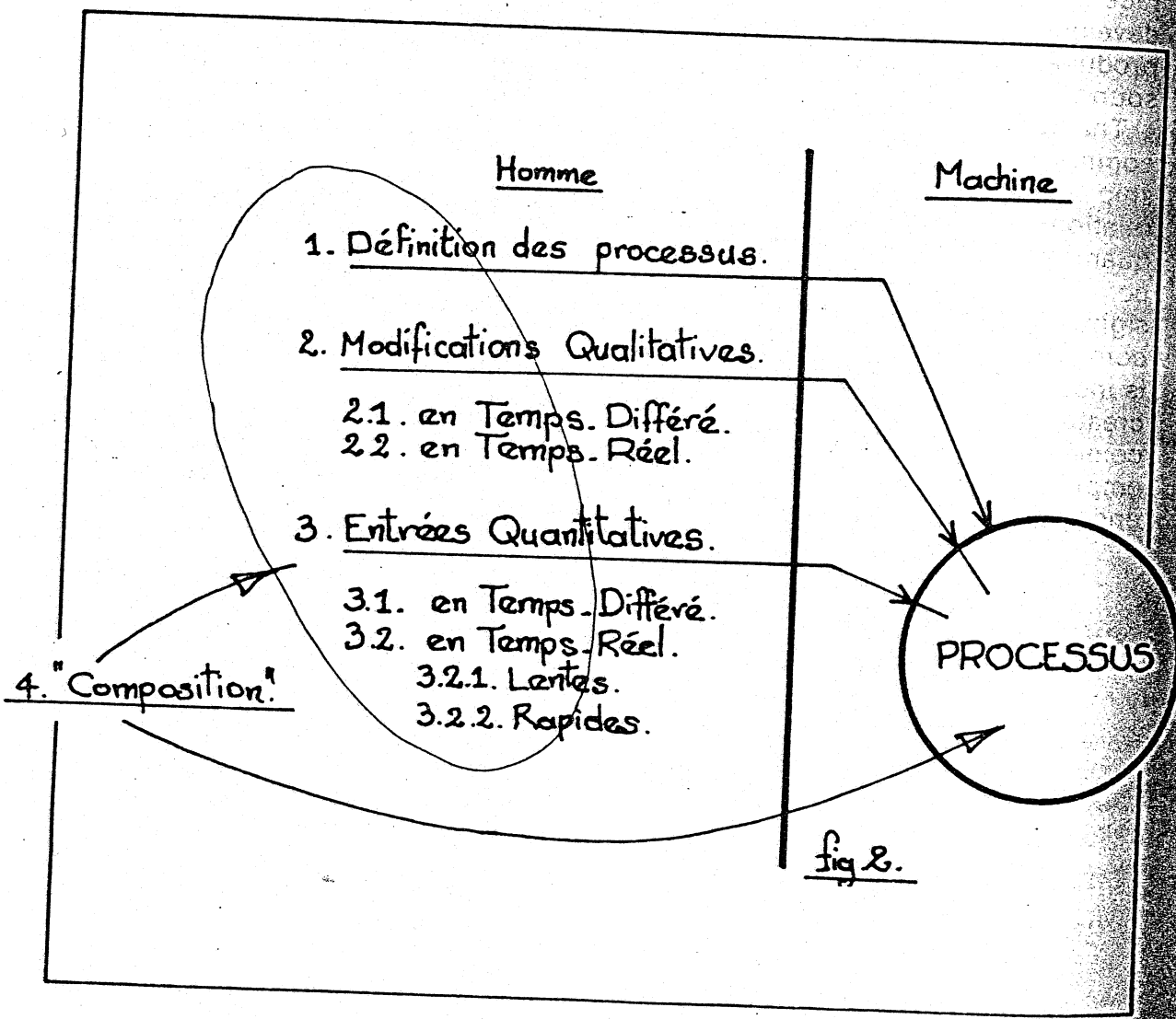


In point of fact infinite power does not exist, and one soon reaches the upper limits in all installations used to date for computer music. This situation leads to the process rapidly becoming data. By process, we mean both the microstructural process, i.e. producing sound, and the macrostructural process, i.e. creating a sound event. Limits to power imply choices, hence specification. A qualitative study of processes is therefore decisive. Processes affect the tools of creation even in their most fundamental modes. They often contain often

unconscious germs of the designer's aethestic and even ideological ends.

Without referring to any specific procedure, we can, at this point, describe in detail the actions of any creator using a computer. (Figure 2) The need for a specific process necessarily implies that the first act involves conveying information required for determining these processes. By definition these operations can not lead to the production of sound. If the duration of sound is taken to be reference time, or «real» time, then this act necessarily takes place in «non-real» time (i.e. off-time). Having defined a set of processes, some of which produce sound real-time, other types of intervention are possible via the input channel :

- modifying certain qualitative aspects of the processes either during sound production (real-time) or outside sound production (off-time),
- adding or changing certain quantitative aspects (parameters) outside (off time) or during (real-time) sound production (parameters, variables). A fourth mode of input communication can be added, namely structuring information having an effect on the other three modes or information within the processes themselves.



Each of these inputs is distinct and has its own meaning in terms of the «philosophy» chosen, according to the processes involved and in particular to the models of sound production involved.

We emphasize the fact that evaluation of synthesis models is generally based on criteria in which only one of the above-mentioned types of communication is considered to be significant to the detriment of all the other types. We also

describe some of the most fundamental and significant approaches and in this paper we attempt to prove that at present most approaches are invariably linked to one implicit conception of musical creation which considers the abstract mode of conception as being virtually the only form of creation.

Taking into account the concrete dialogue between the creator and his tools and its symbolic function as constituent of and providing structure, we explain our theoretical approach and demonstrate that from this vantage point all four types of input modes are strictly equal and must be studied with the same care and on an equal footing.

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